(12) UK Patent Application (19) GB (11) 2 179 903 (13) A

(43) Application published 18 Mar 1987

(21) Application No 8621485

(22) Date of filing 3 Feb 1984

Date lodged 5 Sep 1986

(30) Priority data
(31) 8301196 (32) 4 Mar 1983 (33) SE

(60) Derived from Application No 8402865 under Section 15(4) of the Patents Act 1977

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(51) INT CL[4]
B63H 5/12

(52) Domestic classification (Edition I):
B7V BH

(56) Documents cited
GB 1460387 GB 1316910 EP 0035600
GB 1324799 EP A 0159144

(58) Field of search
B7V
Selected US specifications from IPC sub-class B63H

(54) A vessel having parallel hulls

(57) An offshore vessel has two parallel hulls and carries propulsion machinery includuing azimuth thruster propeller units, each comprising a 360° rotatable casing (41) mounting a propeller housing (42) with a propeller (47), a drive shaft (44) through the casing being connected to a propeller shaft (46) in the housing by means of an angle gearing (45), with the angle between the drive shaft and the propeller shaft being greater than 90°.

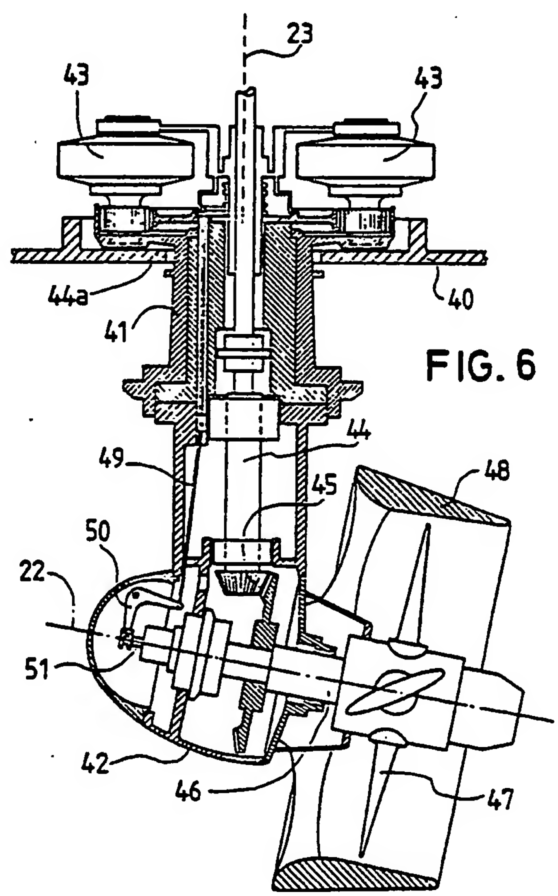

FIG. 6

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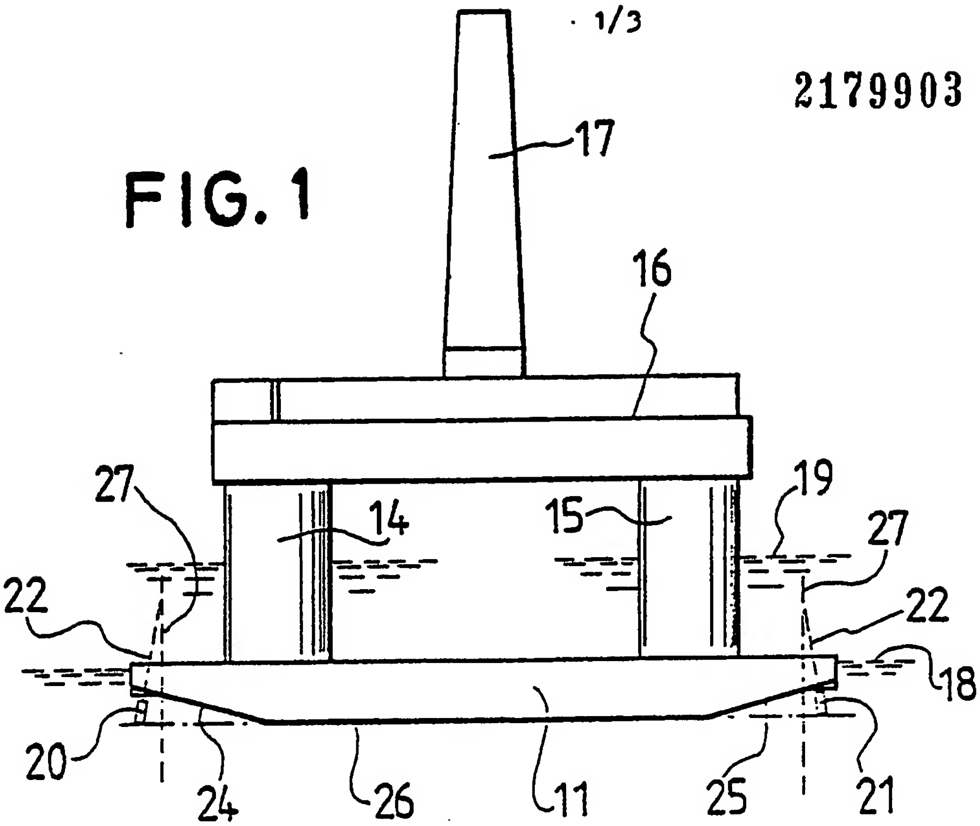


FIG. 1

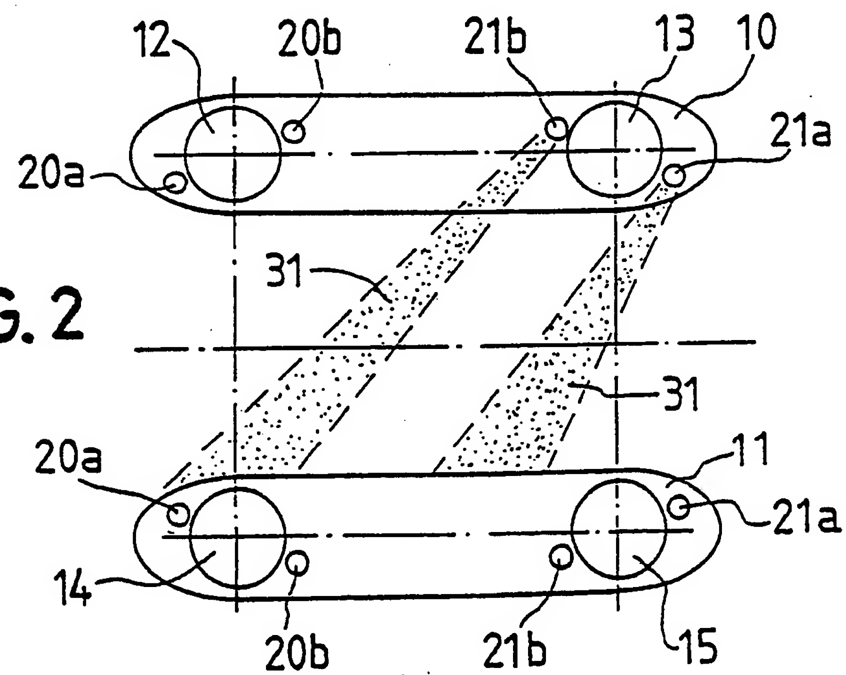
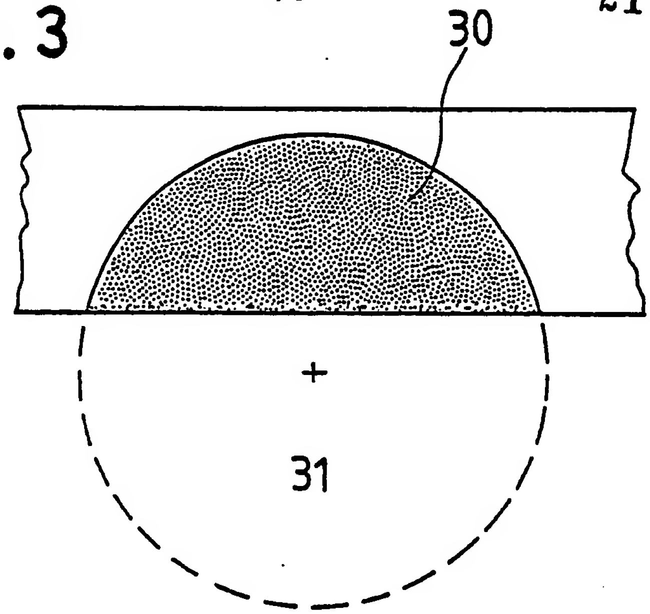


FIG. 2

FIG. 3



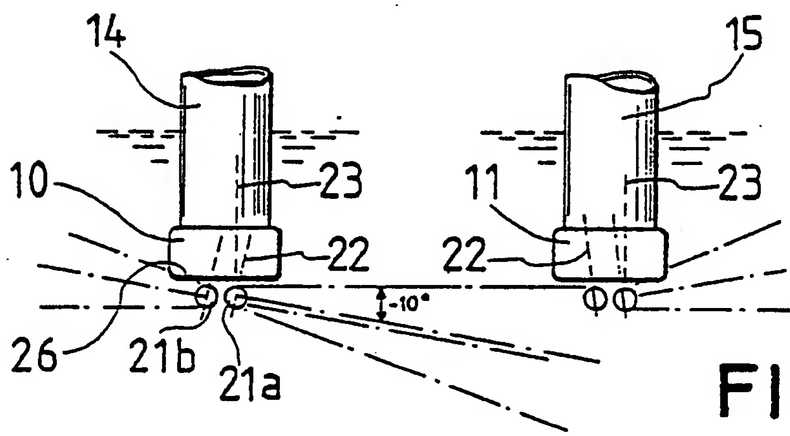
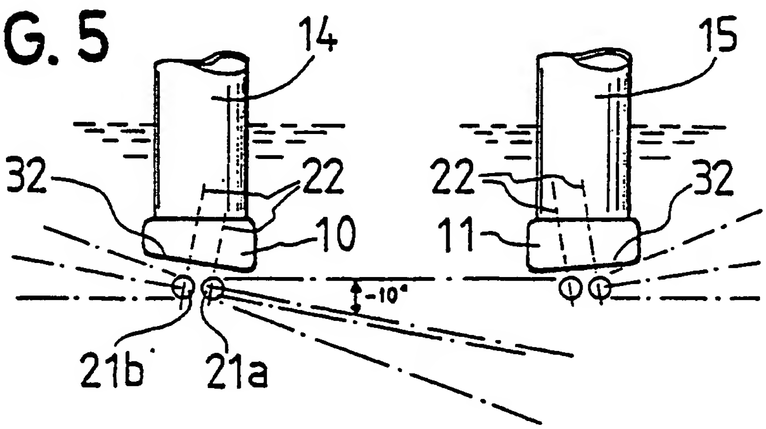


FIG. 4

FIG. 5



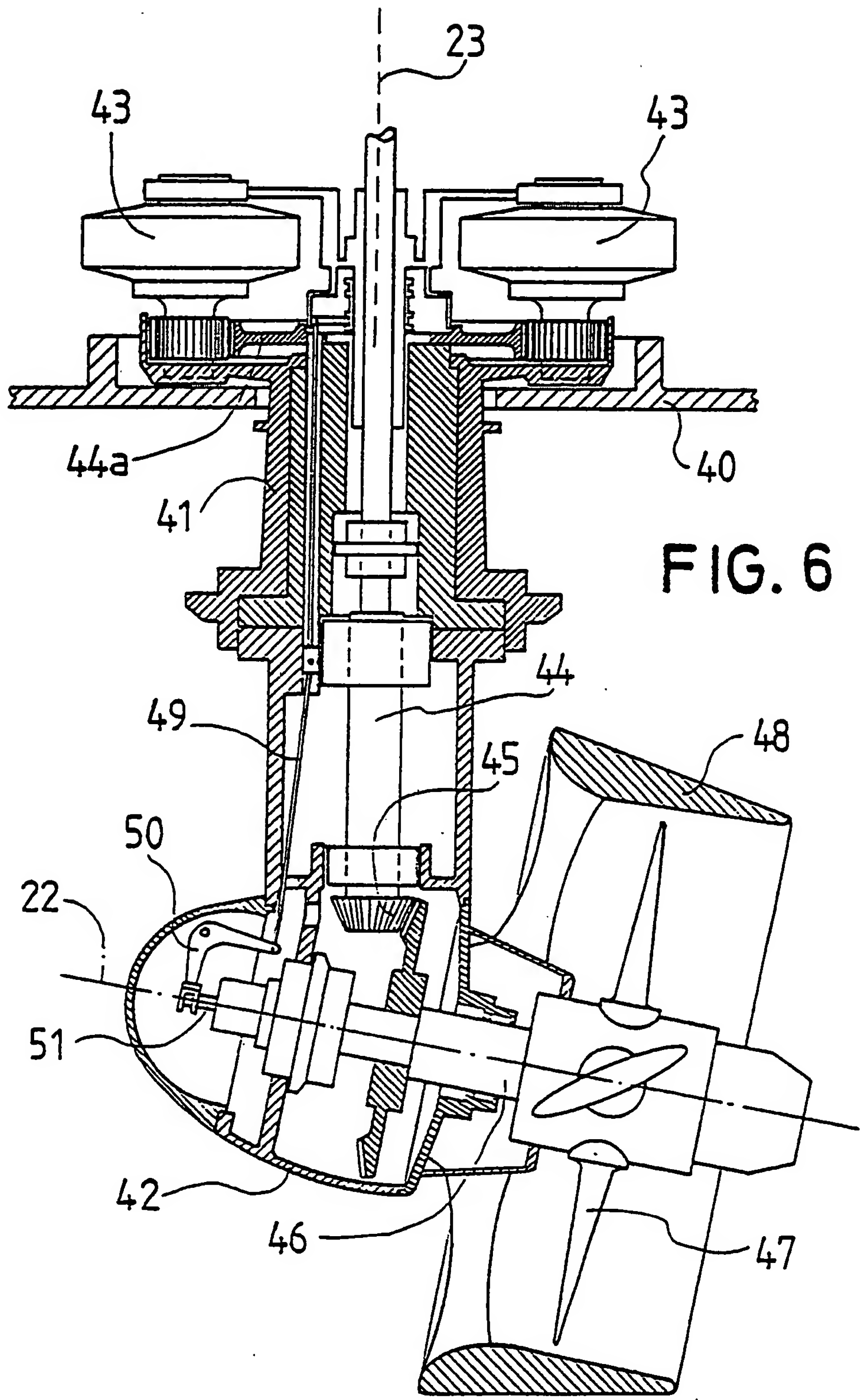


FIG. 6

SPECIFICATION

A vessel having parallel hulls

The present invention refers to vessels having parallel hulls, for example semi-submersible offshore vessels having twin underwater hulls, provided with propulsion machinery comprising a number of azimuth thruster propellers. The invention may also be applied to certain catamaran-type vessels.

Each thruster propeller is rotatable 360° in relation to the vertical, and is used for propulsion as well as for steering. A very important function of these propellers is to retain the vessel in a desired working position during operation.

These thruster propellers are necessarily mounted below the bottom plating of the hulls.

During a voyage the action of wind, waves and streams may make it necessary to direct one or more propellers disposed at one of the hulls in an orientation so that the water jet, or jets therefrom will be directed towards the other hull. Such a directing of one or more propellers will be especially noticeable, when it is desirable to retain the vessel in a desired position. The portion of a water jet hitting the side of the adjacent hull will of course apply a force upon the latter, which causes an undesirable steering action.

The fact that the thruster propellers project from the bottom plating of the hulls also causes problems during docking and when the vessel is brought into a harbour with a limited water depth.

In order to remove the drawbacks above referred to, the present invention is characterised in that the rotational axis of the housing of each thruster propeller is inclined in relation to the vertical axis so that the water jet from a thruster propeller at one hull, occasionally directed towards the adjacent hull will mainly pass below that hull.

The thruster propeller axis is preferably inclined downwardly/outwardly in relation to the vertical axis.

In order further to improve the thruster action the substantially plane bottom of a hull, at least in the portion thereof adjacent to a thruster propeller may be inclined upwardly/outwardly.

The disadvantage with the thruster propellers projecting below the bottom of the hull, and thus preventing docking if the propellers are not dismounted, may be counteracted by raising the plating in the forebody as well as in the aft body of each hull sufficiently above the base line of the hull, so any thruster propeller fitted within a raised portion will remain above the base line. The thruster propeller axis is then preferably inclined outwardly/downwardly in relation to a transverse plane.

With an offshore vessel having two thruster propellers adjacent to at least one of the columns carried by a hull, the thruster propellers are preferably located at opposite sides of a longitudinal middle plane and a transverse plane through the column.

In an offshore vessel having four columns and two thruster propellers at each of them, the thruster propellers located between the columns carried by the same hull are preferably located outside of a longitudinal middle plane through the hull, while thruster propellers located outside of the columns are located inside of said longitudinal middle plane.

The invention will now be described, by way of example with reference to the accompanying drawings, in which:

Figure 1 shows an elevation of an offshore vessel fitted with thruster propellers according to the invention,

Figure 2 shows a plan view of the twin hulls in which the positions of the thruster propellers have been slightly modified, compared with Fig. 1.

Figure 3 schematically illustrates how a portion of a water jet from one thruster propeller with a conventional arrangement hits upon an adjacent hulls,

Figure 4 shows an end view of hulls having plane bottom plating and thruster propellers mounted in parts,

Figure 5 shows a modified embodiment for obtaining improved water flow from the outward propellers, and

Figure 6 shows, more in detail a thruster propller with an angle gearing.

Fig. 1 shows, very schematically, an elevation of an offshore vessel suited for drilling or for production.

It is provided with two parallel underwater hulls 10 and 11 (of which only one can be seen in Fig. 1), which by means of four columns 12–15 carry an operating platform 16 enclosing workshops, housing for the staff, stores etc. The platform further carries a drilling rig 17, or a derrick.

The water level for the vessel in transit is denoted at 18, and the water level during operation is denoted at 19.

In the fore, as well as in the aft body of each hull there is a thruster propeller 20, 21 or a pair of such propellers. In order to avoid disturbances by the propeller water jets being directed towards an adjacent hull the rotational axes 22 of the thruster propellers, in the manner illustrated in Fig. 4 are inclined downwardly/outwardly, in relation to a geometric vertical axis 23, sufficiently to ensure that the water jet will mainly pass below the opposite hull. Roughly taken, half of the conus angle in the water jet will be 10°.

In order to make possible a docking of the vessel without removing the thruster propellers, the bottom plating 24, 25 of the fore and aft bodies of the hulls is raised sufficiently above the base line 26 of each hull to ensure

that the propellers 20, 21 do not project below said base line.

In the present embodiment the thruster propeller axis is further inclined in relation to a transverse plane 27, preferably sufficiently to bring the rotational axis of the propeller parallel to the adjacent portion of the bottom plating.

Fig. 2 shows a plan view of the hulls at a somewhat modified embodiment of the location of the thruster propellers. A pair of thruster propellers 20a, 20b is provided at each of the aft columns 12 and 14, and a pair of thruster propellers 21a, 21b is provided at each of the forward columns 13 and 15.

These propellers are located in portions of the bottom plating, being substantially plane. If the axis of a propeller housing in a conventional manner remains vertical the propeller water jet from a propeller at one of the hulls, say hull 10, would be conically enlarged sufficiently, when it reaches the other hull 11, to impinge thereon within the shaded portion 30 in Fig. 3. Such impingement against the side of the hull 11 would exert an undesirable steering effect upon the hull.

As is evident from Fig. 4 the axis 22 of the housing of the thruster propeller is inclined sufficiently to ensure that the propeller is water jet 31 from the thruster propeller 21a at hull 10 will pass undisturbed below the bottom of hull 11.

Returning to Fig. 2 this shows two thruster propellers at each column. The area of a propeller water jet cone 31 at the opposite hull will of course depend upon how the propeller is directed.

The area will have its smallest size if the propeller is directed straight at the hull, and will increase as the angle of attack increases. Simultaneously the force applied by the water jet will be reduced due to the increasing distance between the propeller and the actual area of the hull.

In order that the water jets shall disturb each other as little as possible the thruster propellers 20b, 21b located between the columns are fitted outside the longitudinal middle plane of the hulls, whereas the thruster propellers 20a, 21a located outside the columns are fitted inside said plane.

If the bottom plating of the hull within the portion where a thruster propeller is fitted, is plane, the propeller jet from a propeller located outside of the longitudinal middle plane will hit the bottom plating adjacent to the side plating, when the propeller is directed outwards. This is indicated in Fig. 4.

In order to reduce this detrimental action it is advantageous to shape the bottom plating, at least in the portion thereof where a thruster propeller located outside the longitudinal middle plane is fitted, so the plating is inclined upwardly/outwardly in the manner indicated at 32 in Fig. 5.

Fig. 6 shows, more in detail, a modified embodiment of a thruster propeller. The bottom plating of the hull is denoted by 40, and in an opening therein a tubular casing 41 is fitted, at the lower end of which a propeller housing 42 is attached.

The combined casing 41 and housing 42 are rotatable through 360° about the vertical axis 23, by means of hydraulic motors 43, driving a gear wheel 44a mounted upon a drive shaft 44.

An angle gearing 45 enclosing an angle greater than 90° connects the vertical driving shaft 44 with a propeller shaft 46. The rotational axis for the propeller is, as before, denoted by 22.

The propeller is denoted by 47 and is, in a conventional manner, enclosed by a shroud ring 48. The blades of the propeller are adjustable, and the blade adjusting mechanism built into the hub of the propeller, is actuated by a link mechanism 49, 50, 51.

The embodiments described above and shown in the drawings are examples only of the invention, the details of which may be varied in many ways within the scope of the appended claims. The shape of the hulls as well as the number of columns may vary, and furthermore the number and the location of the thruster propellers may vary depending upon the requirements concerning propulsion and capacity of positioning the vessel which are imposed upon the thruster propeller machinery.

CLAIMS

1. An offshore vessel having two parallel hulls and carrying propulsion machinery including azimuth thruster propeller units, each comprising a 360° rotatable casing mounting a propeller housing with a propeller, a drive shaft through the casing being connected to a propeller shaft in the housing by way of an angle gearing, so that the angle between said drive shaft and said propeller shaft is greater than 90°.

2. A vessel as claimed in claim 1, wherein the plating in the forebody and/or the aft body of at least one hull is raised sufficiently above the base line of the hull to accommodate the thruster propeller units so that they remain above said base line.

3. A vessel as claimed in claim 2, wherein the plating in the forebody as well as in the aft body of each hull is raised sufficiently above the base line of the hull, so any thruster propeller fitted within a raised portion will remain above the base line.

4. A vessel as claimed in any one of claims 1 to 3, comprising two thruster propeller units adjacent to at least one of the columns carried by a hull, the thruster propeller units being located at opposite sides of a longitudinal middle plane and a transverse plane through the column.

5. A vessel as claimed in claim 4, comprising four columns and two thruster propeller units at each of them, the thruster propeller units located between the columns carried by the same hull being located outside the longitudinal middle plane through the hull, while thruster propeller units located outside of the columns are located inside of said longitudinal middle plane.

6. A vessel as claimed in any one of claims 1 to 5, wherein the substantially plane bottom of a hull, at least in the portion thereof adjacent to a thruster propeller unit is inclined upwardly/outwardly.

7. An offshore vessel substantially as herebefore described with reference to and as shown in Fig. 1, or Fig. 2 or Fig. 4 or Fig. 5, as modified by Fig. 6, of the accompanying drawings.

Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd, Dd 8817356, 1987.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.